Cortical stimulation experiments

Daniel C. Kiper

Nov. 24, 2016

http://www.ini.uzh.ch/~kiper/consciousness.html
Wilder Penfield (1891-1976)
Motor homonculus
Somatosensory homunculus
Wilder Penfield's Brain Stimulation Work

- Penfield's Research (as it is usually reported):
  - Penfield stimulated the cortices of patients about to undergo brain surgery
  - Some of these patients reported vivid memories during stimulation
  - Penfield concluded that memories are highly stable, and that the brain contains a complete record in great detail of past experience

- Penfield's Data (which is usually not reported):
  - Penfield had 1,132 cases
  - Penfield only found memories during stimulation in those patients whose temporal lobe cortex was stimulated. The number who had temporal lobe cortex stimulation was 520 patients.
  - Of these, only 40 patients -- 7.7% -- had a memorial event!
  - Of these 40 patients, not all had a multisensory perceptual event.
    - 24 had an auditory experience
    - 19 had a visual experience
    - 12 had combined auditory and visual experiences
    - 5 had a vague experience like a thought or flashback

- How Truthful Were the Memories Recalled?
José Manuel Rodriguez Delgado
Brain stimulation experiments

Libet’s Time-On Theory
Libet's dual stimulation studies: cortex and skin

Stimulating the Cortex

-500ms

experienced consciousness

0 ms

'realized' consciousness

400 ms

Stimulating the Skin

'experienced' consciousness

'realized' consciousness
Area MT and the perception of visual motion
William T. Newsome
Stimulus for measuring motion sensitivity

No Correlation

50% Correlation

100% Correlation

Newsome, Britten, Movshon and Shadlen
Motion sensitivity of a macaque

Proportion correct

Correlation (%)
Protocol for measuring motion sensitivity of an MT cell and of the whole macaque
Responses of an MT cell

![Graph showing responses of an MT cell](image)
Perceptual and neural sensitivity
Functional map of direction selectivity in area MT
Microstimulation in MT influences perception

Salzman, Murasugi, Britten and Newsome, 1992
The Claustrum